

APPENDIX C

**Maintenance Standards
for Generators
with
Suggested Implementation
and Enforcement Model**

**Approved by
The California Electricity Generation Facilities
Standards Committee**

Established Pursuant to SBx2 39

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SECTION 1

MAINTENANCE STANDARDS

FOR GENERATORS

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INTRODUCTION

Fundamental standards must be met by a generation maintenance organization if it is to be successful over time in maintaining the performance of the generating assets. This document highlights these important performance standards and provides a set of assessment guidelines to facilitate evaluation of the performance of the organization with respect to each standard. . The standards were developed in conjunction with Appendix A, Maintenance Guidelines for Electric Generating Facilities, which will provide additional insight in to how to meet a standard.

The purpose of this document is to define the standards for generating asset owners to use in the self-assessments and certification of their maintenance program. CPUC auditors will also use this document during the audit of a facility to determine the adequacy of its maintenance program. The standards address both line organization and functional performance areas. The line organization performance areas focus on the traditional departmental performance, primarily for the maintenance organization. The functional performance areas focus on processes and behaviors that cross-organizational boundaries and that address maintenance department organizational integration and interfaces. Operations, engineering, and chemistry have been included at the functional levels, to the extent that those activities are integral to the larger concept of maintenance. There clearly is some redundancy in the assessment guidelines between the performance standards as a result of addressing both organizational and functional requirements. The functional categories interwoven into the performance standards include:

- Safety
- Problem Resolution and Continuing Improvement
- Equipment Performance and Monitoring
- Work Management
- Plant Status and Configuration
- Training

For each performance standard there is a set of assessment guidelines intended to provide a sense of the breadth and depth of the standard. These represent of a collection of “Best Practices”, and not an exclusive set of criteria to demonstrate that a standard is being met. Those performing audits and assessments must keep in mind that the assessment guidelines may not be all inclusive of activities associated with the performance standard. It may be beneficial to the user of this document to refer to Appendix A, Maintenance Guidelines for Electric Generating Facilities, to gain additional insight regarding how to satisfy a particular performance standard. Generating asset owners may use different approaches to meet the standards. Given that the assessment guidelines represent only a means to an end, the certification process emphasizes achievement of the performance standards.

Generating asset owners are to use this document in performing the self-assessments required for initial certification and periodic re-certification that their programs meet the intent of the Generation Maintenance Standards and Assessment Guidelines. During the certification process, each asset owner must document in summary format how each standard is being met. In cases where a standard is not being satisfied, the asset owner must provide an action plan and time line for achieving the standard, or adequately justify its alternative to the standard.

PERFORMANCE STANDARDS - EXECUTIVE SUMMARY

The following is a summary of the eighteen (18) performance standards, grouped into nine (9) functional/organizational categories, which represent fundamental organizational and functional standards required to effectively maintain a generating asset. They are not meant to be all-inclusive, nor are they meant to be mutually exclusive. They were developed for a large population of generating assets, of diverse technologies, diverse geographic locations and owned and operated by a diverse universe of corporate structures. It is recognized that there may be some unique circumstances where a generating asset owner may perceive that a particular performance standard does not apply to their situation. It is also likely, if not a certainty, that a wide variety of methods are applied toward achieving applicable performance standards. That notwithstanding, this is the set of performance standards against which each generating asset owner is required to assess the maintenance program(s) applied to their generating assets. In this section, the detailed performance standards and a set of assessment guidelines are provided. The assessment guidelines should be useful when assessing of the degree compliance necessary to meet each performance standard.

I. MAINTENANCE ORGANIZATION MANAGEMENT AND LEADERSHIP

- A. Safety Performance** - The protection of life and limb for the work force is the paramount performance standard.
- B. Organizational Structure and Responsibilities** - A line organization with responsibility and accountability for establishing and implementing a maintenance strategy to support company objectives for reliable station operation is clearly defined, communicated, understood and is effectively implemented.
- C. Maintenance Management and Leadership** - Maintenance managers establish high standards of performance and align the maintenance organization to effectively implement and control maintenance activities.
- D. Problem Resolution and Continuing Improvement** - The company values and fosters an environment of continuous improvement and timely and effective problem resolution.

II. MAINTENANCE PERSONNEL RESOURCES

- A. Maintenance Personnel Knowledge and Skills Performance** - Maintenance personnel are trained and qualified to possess and apply the knowledge and skills needed to perform maintenance activities that support safe and reliable plant operation.
- B. Training Support** - A systematic approach to training is used to achieve, improve, and maintain a high level of personnel knowledge, skill, and performance.

III. MAINTENANCE STRATEGY

- A. Balance Of Maintenance Approach** - The maintenance program includes the proper balance of the various approaches to maintenance, e.g., preventive, predictive, or corrective.

IV. MAINTENANCE PROCEDURES USE

- A. Maintenance Procedures and Documentation** - Maintenance procedures and documents are clear and technically accurate, provide appropriate direction, and are used to support safe and reliable plant operation. Maintenance procedures and documents should include the generation equipment and all those components owned by the generation owner directly connected to the plant that are an integral part of delivering power to the grid including fuel supply systems, electrical switchyards, transmissions lines, penstocks, flumes, exhaust system, etc.
- B. Conduct of Maintenance** - Maintenance is conducted in an effective and efficient manner so equipment performance and materiel condition effectively support reliable plant operation.

V. WORK MANAGEMENT PROCESS

- A. Work Management** - Work is planned, scheduled, coordinated, controlled, and supported with resources for safe, timely, and effective completion.
- B. Plant Status and Configuration** - Station activities are effectively managed so plant status and configuration is maintained to support reliable and efficient operation.

VI. PROCUREMENT OF PARTS, MATERIALS AND SERVICES

- A. Spare Parts, Material and Services** - Correct parts and materials in good condition, are available for maintenance activities to support both forced and planned outages.

VII. EQUIPMENT PERFORMANCE AND MONITORING

- A. Equipment Performance and Materiel Condition** - Equipment performance and materiel condition support reliable plant operation.
- B. Engineering and Technical Support** - Engineering activities are conducted such that equipment performance supports reliable plant operation.
- C. Chemistry Control** - Chemistry controls optimize chemistry conditions during all phases of plant operation and system non-operational periods.
- D. Regulatory Requirements** - Regulatory compliance is paramount in the operation of the generating asset.

VIII. MAINTENANCE HISTORY

- A. Equipment History** - Maintenance standards or procedures clearly define requirements for equipment history for the systems and equipment, including, what information or data to collect, how to record data, and how the data is to be used.

IX. MAINTENANCE FACILITIES, TOOLS, AND EQUIPMENT

- A. Maintenance Facilities and Equipment** - Facilities and equipment are adequate to effectively support maintenance activities.

PERFORMANCE STANDARDS AND ASSESSMENT GUIDELINES

I. MAINTENANCE ORGANIZATION MANAGEMENT AND LEADERSHIP

A. Safety

1. Performance Standard

The protection of life and limb for the work force is paramount. The company behavior ensures that individuals at all levels of the organization consider safety as the overriding priority. This is manifested in decisions and actions based on this priority. The work environment, and the policies and procedures foster such a safety culture, and the attitudes and behaviors of individuals are consistent with the policies and procedures.

2. Assessment Guidelines

- A. Individuals at all levels in the organization contribute to the safety culture of the work environment through:
 - 1. Demonstrating a great respect for safety in all actions and decisions.
 - 2. Demonstrating a questioning attitude by challenging existing conditions, considering the potential adverse consequences prior to proceeding, and willingness to stop work in the face of uncertainty.
 - 3. Demonstrating a willingness to identify problems and ensure they are corrected.
 - 4. Accepting accountability for their own performance, including recognizing shortfalls and acting to improve.
 - 5. Holding their co-workers accountable for their performance.
 - 6. Using peer checking as a means of protecting themselves and others.
- B. Managers in the organization contribute to the safety culture of the work environment through:
 - 1. Establishing standards and clearly communicating expectations that safety is the highest priority.
 - 2. Maintaining an environment that welcomes identification and communication of problems.
 - 3. Reinforcing individual behaviors that promptly and forthrightly identify problems.
- C. Work practice norms in the organization promote the safety culture through:
 - 1. Appropriate defenses, such as technical accuracy, precautions, cautions and notes, are explicitly embedded in procedures, processes, and

equipment configuration to minimize the occurrences and consequences of inappropriate actions.

2. Clearly defined responsibility and authority for implementing a conservative approach with respect to stopping activities and seeking assistance or guidance when faced with uncertain conditions are communicated to all personnel. This expectation is reinforced frequently.
3. Ensuring safety concerns are promptly identified and resolved.
4. Training which reinforces safety practices and expected behaviors.

B. Organizational Structure and Responsibilities

1. Performance Standard

The organization with responsibility and accountability for establishing and implementing a maintenance strategy to support company objectives for reliable station operation is clearly defined, communicated, understood and is effectively implemented. Reporting relationships, control of resources, and individual authorities support and are clearly defined and commensurate with responsibilities.

2. Assessment Guidelines

- A. The organizational structure and the responsibilities and authorities of each organizational position are clearly defined and communicated to maintenance and other station personnel, including contractors and temporary employees.
- B. The line organization is established as the principal focus of management, the principal source of information, and the only source of management direction.
- C. Interfaces with supporting organizations, including company work groups such as transmission and distribution, fuel suppliers, contractors, and temporary workers, are clearly defined and understood.
- D. Decisions are made at the appropriate level within the organization, considering:
 1. The understanding of the effect on personnel safety, and equipment reliability
 2. The value added to, and the potential adverse effects on, plant operations under all conditions
 3. The effects on other work groups
- E. Technical and managerial support is readily available to the maintenance manager.

- F. Administrative controls such as policies, procedures, and schedules are implemented for activities affecting safe and reliable plant operation and maintenance. Such policies, procedures should address things such as:
 - 1. infrequently performed tests and evolutions
 - 2. procedure use and adherence
 - 3. training and qualification of maintenance personnel
 - 4. communications
 - 5. fitness for duty
- G. Key processes that contribute to safe and reliable plant operation are designed, managed, and improved. Each process has a sponsor who is responsible for its effectiveness.
- H. Contract and other non-plant personnel use and are held accountable for using the same (or equivalent) station-approved policies, procedures, and controls and the same quality standards as station personnel.
- I. Station and utility personnel are adequately trained and equipped to mitigate the consequences of normal or emergent conditions and to manage emergency situations.

C. Maintenance Management and Leadership

1. Performance Standard

Maintenance managers establish high standards of performance and align the maintenance organization to effectively implement and control maintenance activities.

2. Assessment Guidelines

- A. Leadership and Accountability
 - 1. High standards of performance are established and reinforced for maintenance activities. Personnel are held accountable for implementing these standards. Shortfalls in meeting expectations are evaluated, understood, and addressed promptly.
 - 2. Maintenance managers demonstrate a broad knowledge of their areas of responsibility and effectively integrate maintenance organization actions with the functions and activities of other appropriate station and company organizations.
 - 3. Maintenance managers motivate personnel to improve performance by taking initiative and eliminating inappropriate barriers.
 - 4. Personnel throughout the organization are aligned to achieve common goals.
 - 5. By example, managers consistently demonstrate their commitment to improve station performance and to achieve station goals and objectives.
 - 6. Maintenance management is accountable for the training, qualification, and performance of maintenance personnel.

7. Managers are trained on and effectively implement human interaction skills that result in improved teamwork, collaboration, and motivation.
8. Personnel are actively encouraged to admit errors, seek help when they are faced with uncertainty, and assume responsibility for their decisions.

B. Management Direction and Expectations

1. Maintenance management directions, such as goals, initiatives, expectations, and priorities, are effectively used to enable personnel to make decisions, take actions, and implement changes that contribute to safe and reliable plant operation.
2. Goals are established to challenge the organization to continually improve. Results are measurable and are periodically evaluated to determine effectiveness.
3. Strategic direction for improving performance is established and clearly communicates the priorities for long-term and near-term performance to maintenance personnel.
4. Priorities for daily activities are clearly communicated to affected personnel.
5. Maintenance managers reinforce individual ownership through delegation of authority. Personnel are actively encouraged to admit errors, seek help when needed, assume responsibility for their decisions and actions, and develop methods to improve safety, reliability, quality, and productivity.
6. Administrative controls are implemented for activities that affect safe and reliable plant operations. Examples of activities that should be controlled include job turnovers, use of procedures, use of special tools and lifting equipment, and use and traceability of measuring and test equipment.
7. Contract and other non-plant personnel working in the maintenance area use the same (or equivalent) station-approved policies, procedures, and controls and the same quality standards as station maintenance personnel.

C. Planning and Implementing

1. Maintenance managers ascertain that plant staffing and resources are sufficient, including that maintenance personnel have requisite knowledge, skill, proficiency, and familiarity with the operations of the plant(s) where they perform maintenance to accomplish tasks to achieve safe and reliable plant operation.
2. The maintenance organizational structure is clearly defined. Responsibilities and authorities of each position are understood.
3. Tasks, responsibilities, authorities, expectations for performance, and interfaces for non-plant personnel are clearly defined and understood.
4. Interfaces with support groups are clearly defined and understood.
5. Future resource needs, such as personnel, capital, equipment and parts, and information, are identified and integrated into business plans.
6. Changes to plant equipment, procedures, and processes are planned and implemented systematically to improve safe and reliable station operation. Change objectives, responsibilities, and implementation

schedules are clearly communicated to affected personnel, and appropriate training is provided.

7. Change initiatives are managed and coordinated.

D. Monitoring and Assessing

Managers continuously and effectively monitor and assess the performance of maintenance activities, with particular attention to:

1. Adherence to maintenance standards, policies and procedures, especially worker safety.
2. Work practices and worker skills and knowledge.
3. Performance of services provided by outside organizations or contractors.
4. Work management implementation, including use of schedules, work packages, documentation of work for work history, and providing work status updates.
5. Equipment performance and material condition.
6. General area housekeeping.
7. Developing and using performance measures to monitor organization performance. Typical measures might include, but not be limited to:
 - a. Maintenance work backlogs.
 - b. Amount of rework.
 - c. Work Management Indicators
8. Managers effectively follow-up on issues identified or problems noted and provide feedback to affected parties. Reinforcement of desired behaviors is also provided.
9. Managers frequently interact with maintenance and station personnel to coach and mentor desired behaviors.

E. Follow-up, Reinforcement, and Feedback

1. Maintenance managers initiate changes and corrective actions to improve the performance effectiveness of personnel, processes, and equipment.
2. Maintenance managers acknowledge the accomplishments of others and the importance of individual contributions to overall performance. Maintenance managers reinforce behaviors that improve performance.
3. Maintenance managers coordinate resources to accomplish goals and objectives safely and reliably. Adjustments are made and corrective actions are taken to accomplish goals. Timely corrective actions are taken when adverse conditions or trends are identified.
4. Maintenance problems, including events and materiel deficiencies that affect plant operations and maintenance effectiveness, are tracked, investigated, and reviewed periodically for timely resolution.

D. Problem Resolution and Continuing Improvement

1. Performance Standard

The company values and fosters an environment of continuous improvement and timely and effective problem resolution.

2. Assessment Guidelines

A. Self-Assessment

Self-Assessment activities are used to compare actual performance to management's expectations, and to identify and correct areas needing improvement. While self-assessments, by definition, are driven from within, they may be used to measure internal performance to external criteria, such as ISO, EPA or OSHA. Self-assessment is both a discreet activity and a continuous process that includes such activities as:

1. Dedicated teams, with a specific chartered objective to assess certain program(s) or element(s).
2. Management monitoring of on-going performance through performance metrics or problem resolution process monitoring.
3. Discreet event investigations

B. Problem Reporting, Root-Cause Analysis, and Corrective Actions

A systematic approach and process is used to identify and report problems, determine the cause(s) and establish corrective actions to prevent recurrence. Attributes of successful programs include:

1. Encouraging employees to report problems at low thresholds of significance.
2. Using a graded approach to significance, and performing more extensive root cause determination to those problems having high significance, and trend and track those with low significance.
3. Trending capability on information such as "cause code" or equipment or process involved.
4. Tracking of corrective actions to closure.

C. Operating Experience

Management processes exist to capture, evaluate, and initiate, required actions to incorporate lessons learned from other departments, stations or organizations. (Some successful stations incorporate this into their Problem Reporting/Corrective Action process.)

D. Benchmarking and Emulation

Managers seek improvement by benchmarking performance or processes against better performers.

E. Human Performance

Behaviors that contribute to excellence in human performance are reinforced to continuously strive for event free operations as evidenced by:

1. Individuals taking responsibility for their own actions and are committed to improve maintenance performance.
2. Individuals making conservative decisions when faced with uncertain or unexpected conditions.
3. Searching out and eliminating conditions that lead to poor human performance, such as poor labeling, poor lighting, hard to read prints, etc.
4. Focusing attention on the task at hand to reduce likelihood of error, including self-checking and peer checking.
5. Coaching and mentoring on human performance techniques and practices.

II. MAINTENANCE PERSONNEL RESOURCES

A. Maintenance Personnel Knowledge and Skills

1. Performance Standard

Maintenance personnel are trained and qualified to possess and apply the knowledge and skills needed to perform maintenance activities that support safe and reliable plant operation.

2. Assessment Guidelines

- A. Maintenance personnel capabilities and aptitude meet established entry criteria for their assigned positions.
- B. Maintenance personnel possess job-related knowledge and skills
- C. On-the-job training and evaluation criteria are identified, completed, and documented before personnel are assigned to perform tasks independently.
- D. Continuing training is implemented to maintain and enhance knowledge and skills and to address areas such as plant equipment and procedure changes, infrequently used and difficult skills and lessons learned from operating experience.
- E. Training and evaluation methods and standards are sufficient to verify trainee and contractor competence for assigned functions.
- F. Initial and continuing training, including programs to develop and maintain managerial skills, are effectively implemented.
- G. Contract maintenance technicians and other non-plant maintenance personnel possess knowledge and skills equivalent to those of station maintenance personnel for their assigned functions and are task-qualified prior to independent work assignment.
- H. Facilities, equipment, and tools are provided and maintained to effectively support training activities.

B. Training Support

1. Performance Standard

A systematic approach to training is used to achieve, improve, and maintain a high level of personnel knowledge, skill, and performance.

2. Assessment Guidelines

- A. Managers are responsible and accountable for the training and qualification of personnel assigned to their work groups.
- B. Training administrative controls address the following requirements, as appropriate:
 - 1. Training program content
 - 2. Management of training
 - 3. Qualification of training staff
 - 4. Analysis, design, and development of training
 - 5. Classroom training
 - 6. In-plant and laboratory training
 - 7. Simulator training
 - 8. Evaluation of training effectiveness
- C. Training is used to improve personnel performance.
- D. Management expectations and standards are reinforced during training.
- E. A systematic process is used to develop needed training.
- F. Training management supports the line organization by maintaining an awareness of current industry training issues, identifying similar precursor conditions, and initiating proactive corrective actions.
- G. Periodic reviews of applied fundamentals are integrated into continuing training.
- H. A systematic assessment process is used to determine training needs for managers, including leadership, management, technical, administrative, and decision-making skills.
- I. Workers from off site, such as contractors or workers from other facilities are appropriately trained and task-qualified before they work independently.
- J. General employee training provides plant personnel, contractors, and visitors with a basic understanding of employee responsibilities and safe work practices and with the knowledge and practical abilities necessary to effectively implement their work.

III. MAINTENANCE STRATEGY

A. Balance of Maintenance Approach

1. Performance Standard

The maintenance program includes the proper balance of the various approaches to maintenance, e.g., preventive, predictive, or corrective. The approach is adequately documented with consideration of economics and reliability of equipment or components, and their affect on reliable operation of the unit. Operating experience is factored into the program. Maintenance procedures and documents should include the generation equipment and all those components owned by the generation owner directly connected to the plant that are an integral part of delivering power to the grid including fuel supply systems, electrical switchyards, transmissions lines, penstocks, flumes, exhaust system, etc.

2. Assessment Guidelines

- A. Preventive maintenance is proper for the equipment whose failure adversely impacts safety or reliable operation or results in forced outages, or significant derates.
- B. Preventive maintenance is appropriately balanced between time based and condition based, as appropriate for the equipment.
- C. The preventive maintenance program is supported by a master equipment database.
- D. Preventive maintenance tasks are technically based, including vendor input and industry experience.
- E. Preventive maintenance tasks are properly documented in procedures, and receive appropriate planning prior to scheduling.
- F. Qualified personnel perform preventive maintenance tasks.
- G. Preventive maintenance is effectively coordinated into operational and outage planning to prevent unnecessary repetitive removal of equipment from service for maintenance.
- H. Predictive maintenance data receives appropriate technical review and is trended to predict when maintenance should be done to prevent failure.
- I. Predictive maintenance data is captured in equipment history in a manner to support maintenance analysis and equipment performance problem analysis.

- J. Performance of predictive maintenance is monitored through effective performance measures.
- K. The effectiveness of predictive maintenance tasks is periodically reviewed for effectiveness.
- L. Equipment or components that are degraded or not performing their intended function are restored in a timely manner, consistent with their respective importance to personnel safety and efficient, reliable operation of the unit.
- M. Perform activities that can affect personnel safety or plant reliability only after safety and operational assessments, detailed planning and scheduling, job briefings, and coordination with all necessary personnel have been completed.
- N. Personnel should be knowledgeable of maintenance work activities that may result in changes in plant configuration, e.g., unauthorized part substitutions, repairs that do not comply with design specifications or code requirements.
- O. Schedule work to maximize critical system availability and to ensure maintenance can be performed within committed time limits.
- P. Post maintenance testing, sufficient to verify that functionality has been restored, is performed prior to restoring equipment to service.

IV. MAINTENANCE PROCEDURES USE

A. Maintenance Procedures and Documentation

1. Performance Standard

Maintenance procedures and documents are clear and technically accurate, provide appropriate direction, and are used to support safe and reliable plant operation. Procedures must be current to the actual methods being employed to accomplish the task and are comprehensive to ensure reliable energy delivery to the transmission grid

2. Assessment Guidelines

- A. The preparation, review, approval, and revision of procedures and documents are properly controlled and timely.
- B. Documents used in lieu of procedures, such as excerpts from vendor manuals, receive sufficient review and approval to verify accuracy needed to support the intended use.
- C. New and revised procedures are reviewed for technical accuracy prior to initial use and are verified and validated for correctness and usability prior to/or during initial use.
- D. Procedures are clear and concise and contain sufficient information for users to understand and perform activities effectively. Necessary elements include the following:
 - 1. Technical details such as setpoints, tolerances, control logic, and equipment numbers are correct and consistent among procedures, drawings, valve lineup sheets, and system descriptions.
 - 2. Procedures specify portions or steps of other documents that are to be referenced or used when a procedure is performed.
 - 3. Human factor considerations, such as the sequence of procedure steps and the placement of notes and caution statements, are incorporated into procedures to reduce the likelihood of error.
 - 4. The level of detail in procedures is consistent with the training and qualification of the users.
 - 5. Maintenance procedures and documents should include the generation equipment and all those components owned by the generation owner directly connected to the plant that are an integral part of delivering power to the grid including fuel supply systems, electrical switchyards, transmissions lines, penstocks, flumes, exhaust system, etc.
- E. Hold points, such as quality checks, are included in procedures as needed.
- F. A policy governing the use of procedures is implemented. The policy includes the following:

1. Directions for when procedures are to be used as general guidance, followed step-by-step, or signed off for each step
 2. Directions for when a procedure must be physically at the job site
 3. Actions to be taken when procedures conflict or are inadequate for the intended task or when unexpected results occur
 4. Actions to be taken when a procedure activity is interrupted
- G. Temporary changes to procedures, if used, are controlled, including the following:
1. Appropriate review and authorization prior to use
 2. User awareness of applicable temporary changes
 3. Timely incorporation into permanent revisions, when appropriate
- H. Procedures, documents, drawings, and other work-related references are readily accessible, authorized, clearly identified, controlled, technically accurate, and up to date.
- I. Maintenance instructional aids reflect procedure guidance.
- J. Procedures are periodically reviewed for technical accuracy, human factors, considerations, and inclusion of lessons learned from operating experience.
- K. Procedure users are encouraged to provide feedback to procedure writers to identify such items as inaccuracies, difficulties in use, and suggestions for improvement.

B. Conduct of Maintenance

1. Performance Standard

Maintenance is conducted in an effective and efficient manner so equipment performance and materiel condition effectively support reliable plant operation.

2. Assessment Guidelines

- A. Personnel exhibit professionalism and competence in performing assigned tasks that consistently result in quality workmanship.
- B. Maintenance is performed by or under the direct supervision of personnel who have completed applicable qualification for the tasks to be performed.
- C. Personnel seek appropriate guidance before proceeding when uncertainties or unexpected conditions arise.
- D. Maintenance personnel accurately transfer pertinent information during turnovers.

- E. Personnel identify and pursue corrective action for human performance and plant deficiencies with a goal of maintaining equipment performance and materiel condition to support safe and reliable plant operation.
- F. Maintenance work is properly authorized, controlled, and documented. Documentation includes sufficient details of as-found and as-left conditions of the equipment and work performed.
- G. Work activities are performed in accordance with controlled procedures, instructions, and drawings. These documents provide appropriate instruction and details, are technically accurate, and are consistently used to perform maintenance in a safe, correct, and efficient manner. Craft and other maintenance personnel identify and provide timely feedback to correct procedure problems.
- H. Effective maintenance practices are followed.
- I. Post-maintenance testing and post-modification testing are performed, results are reviewed, and corrective actions are taken as necessary before equipment is released for service.
- J. Maintenance rework is identified, documented, and trended. Actions to determine causes and corrective actions to prevent recurrence, including periodic reviews for generic implications and trends, are taken to reduce rework.

V. WORK MANAGEMENT PROCESS

A. Work Management

1. Performance Standard

Work is identified and selected based on value to maintaining reliable plant operation. Work is planned, scheduled, coordinated, controlled, and supported with resources for safe, timely, and effective completion.

2. Assessment Guidelines

A. Work Identification and Selection

1. Equipment deficiencies and work activities are identified using a simple, efficient method. Necessary elements include the following:
 - a. Operating personnel are notified of deficiencies and work activities that potentially affect equipment performance or operability.
 - b. Equipment deficiencies are identified early to avoid further degradation and to support resolution using routine or simple corrective actions. Affected personnel are informed of the equipment condition.
 - c. Requested work activities and equipment deficiencies are clearly described so the work scope, significance, and need are evaluated.
2. Criteria are established and used to identify, categorize and evaluate work activities based on the extent of detailed reviews, approvals, documentation, planning, or scheduling required to safely execute the work. These criteria provide a means to enhance efficiency without compromising plant reliability and personnel safety.
3. Knowledgeable personnel using approved criteria and guidelines evaluate work activities. This evaluation addresses priority, category, and plant conditions required to do the work.
4. Requested and approved work activities are tracked until dispositioned. The status of incomplete and pending work activities is maintained and readily accessible.
5. Pending work activities are periodically reviewed for continued need.
6. Work requests are screened and approved based on value to the station and alignment with station and company business plans and long-term performance goals.
7. Modifications and major maintenance activities are integrated into a long-range plan that identifies appropriate staffing and budget resources.
8. Identification and selection of work activities incorporate applicable lessons learned from operating experience.

B. Work Planning

Not all work will require rigorous planning. But all work will require at least an assessment, at some designated level, to determine what level of planning, if any, beyond assignment to craft will be required.

1. Knowledgeable personnel using approved criteria and guidelines that include factors such as the following perform work planning:
 - a. Operational configuration constraints
 - b. Materials, tools, work duration, and manpower needs
 - c. Intra and interdepartmental coordination
 - d. Special skills
 - e. Equipment testing for functionality and operability following maintenance or modifications
 - f. Industrial safety considerations for worker and equipment protection and environmental protection
 - g. Special engineering features (such as fire or flood barriers, temporary staging, and shielding)
 - h. Previous work history
 - i. Quality control considerations
 - j. Industry experience
 2. Work planning for in-service and outage maintenance, modification, and testing activities incorporates the above factors and the following:
 - a. Contingency plans to the extent practical to restore equipment to service if emergent problems occur during maintenance
 - b. Actions to reduce event initiators or augment mitigation systems when removal of a system or component from service would result in a significant increase in risk
 3. Emergent work activities are evaluated for impact on operational plans and scheduled activities and resources.
 4. The level of work planning detail and instructions is based on the complexity and operational significance of the activity and takes into consideration the training, experience, and skills of the workers.
 5. Tools, equipment, materials, and parts are identified sufficiently early in the planning process to support the schedule.
 6. Clearly defined post maintenance and post modification testing criteria are identified that include the following:
 - a. Written and approved test instructions or procedures, including prerequisites
 - b. Sufficient test scope to verify that work has corrected the deficiency
 - c. Quantitative test acceptance criteria, where appropriate
 7. Troubleshooting activities are planned using a systematic method to identify the causes of equipment problems. Where appropriate, such activities are controlled by work documents or instructions that have appropriate approvals, limitations, and precautions on the scope and boundaries of the activities and control over configuration changes.
- C. Scheduling and Coordination
1. Work activities are analyzed and scheduled to minimize operational limitations and manage risk.
 2. Integrated scheduling is used to coordinate work activities, minimize the impact on operations, manage risk, and align priorities. Milestones and schedule freeze dates are established and used to monitor schedule adherence.

3. Work activities are scheduled to allow preparation and coordination among participating organizations.
4. Related and similar work activities are scheduled concurrently or sequentially, as appropriate, to optimize use of resources and minimize impact on plant status and status changes.
5. Emergent work activities are evaluated for inclusion in the work schedule considering inoperable and out-of-service equipment, the impact on operations, status of work planning, and the disruption of scheduled activities and resources.
6. Long-range plans are implemented to optimize availability, reliability, and capability of important plant equipment.
7. Work is scheduled to allow personnel to perform pre-job activities such as work package familiarization walkdowns and to interact with cognizant personnel so that timely changes can be made.
8. The integrated schedule is periodically assessed and adjusted to resolve conflicts and reduce risk. Schedule changes are evaluated against predefined criteria with management approval.
9. Work schedule reports are tailored to the users and provide information necessary to effectively coordinate the work.
10. Scheduling and coordination incorporate applicable lessons learned from operating experience and plant risk analyses.

D. Resource Availability

1. Sufficient plant personnel, with the appropriate training , qualification, and plant specific experience, including specialty expertise, are available to support scheduled and other work activities.
2. Materials and parts meet quality and design specifications and are available to support scheduled and other work activities. Necessary elements include the following:
 - a. Procurement sources and services are selected and approved based on vendor qualifications and performance.
 - b. Nonconforming and damaged materials and parts are controlled to prevent unauthorized use.
 - c. Methods are established to acquire replacement materials and parts not available from the original supplier. Engineering support is provided to qualify substitutions that affect plant configuration.
 - d. Traceability of materials and parts is maintained, as required.
 - e. The quality of stored equipment, materials, and parts is maintained by means such as environmental and shelf-life controls and preventive maintenance.
 - f. Issued materials and parts are controlled and are returned to storage if not used.
 - g. Equipment, materials, and parts brought in by non-plant personnel are subject to inspection, storage, and issue controls equivalent to items received through normal processes.
 - h. Flammable and hazardous materials are identified, segregated, and controlled during receipt inspection, storage, issue, and disposal or return to storage.

3. Facilities and equipment such as lifting equipment, scaffolding, and tools are available to support the integrated schedule and other work activities safely and effectively.

E. Implementation and Control of Work

1. Work is implemented and controlled consistent with the planning and schedule such that personnel qualifications, procedure guidance, and supervision are commensurate with the complexity of the activity.
2. Prior to implementing work activities, involved personnel are aware of applicable lessons learned from prior experience and plant risk and have planned countermeasures to minimize the potential for repetitive problems.
3. Pre-job and post-job briefings are used to promote effective work performance.
4. Equipment configuration changes to protect people, equipment, and the environment during work activities such as safety tagging are effectively controlled, implemented, and verified.
5. Equipment removal from service for maintenance, modification, or testing is authorized by operations personnel based, in part, on plant/system conditions and configuration in conjunction with the work schedule. Operations personnel maintain cognizance of maintenance, modification, and testing activities.
6. Work backlogs are maintained at a manageable level that supports safe and reliable station operation.
7. Good housekeeping in work areas are maintained and industrial safety work controls are used to achieve a high degree of personnel safety.
8. Field changes to maintenance, modification, or testing activities receive technical reviews and approvals similar to the original.
9. Infrequently performed tests or evolutions are conducted using established controls that address the criteria for and guidance covering the development, review, and preparation of these activities.
10. Controls are established to prevent foreign material intrusion from affecting equipment performance.
11. Post-maintenance and post-modification tests are conducted to verify that work was performed correctly and that equipment functional and operational criteria were met.
12. Once equipment is removed from service it is repaired and returned to service in a timely manner.
13. Maintenance, modification, and testing activities are adequately documented.
14. Work status is accurate and accessible for review and follow-up.
15. Work completed is compared to work planned and scheduled to identify improvement opportunities.

B. Plant Status and Configuration

1. Performance Standard

Station activities are effectively managed so plant status and configuration are maintained to support reliable and efficient operation.

2. Assessment Guidelines

A. Plant Status Control

1. Operations personnel are cognizant of the status of plant systems and equipment under their control and of the nature of work being performed.
2. Operations personnel authorize activities that affect the status of installed systems and equipment.
3. Operators maintain a focus on important plant parameters during maintenance situations and identify and address conditions that may be affecting plant parameters as a result of the work activities.
4. Operations personnel are responsible for assessing the operability of important equipment. Information about equipment deficiencies, existing plant configuration, and the design bases for the equipment is used in the assessment. Other personnel, such as in engineering, maintenance, or chemistry, provide technical support for the assessment.
5. Policies and procedures for controlling plant status are effectively implemented. Provisions for special situations, such as extended outages, and post trip recovery, are included.
6. Controls for infrequently performed tests and evolutions maintain the plant within the design basis. Procedures used to control infrequently performed tests and evolutions are reviewed for operational impacts and safety concerns before each test or evolution. Prior training and walkthrough of procedures by the affected personnel verify the controls and identify appropriate contingency actions. Pre-evolution briefings are conducted.
7. The position of valves important to operation are known and accurately recorded. Administrative controls for clearance tagouts or locked valves prevent unauthorized and inadvertent operation while allowing access for off-normal operation.
8. Independent (or concurrent, if appropriate) verification of component position is performed for equipment important to safety and/or critical to reliable plant operation.
9. Checklists or other comparable means are used to verify that proper conditions are established for each mode of plant operation and for mode changes.
10. Procedures are implemented to control the placement of caution, warning, information, and other similar tags on plant equipment and operator aids in the plant.
11. Procedures are implemented to control the placement, removal, and periodic review of temporary modifications for equipment, such as

electrical jumpers, lifted leads, mechanical jumpers, hoses, pipe blanks, and spool pieces.

B. Configuration Control

1. The design authority is clearly defined, including organizational responsibilities and scope of application. Interfaces are controlled to coordinate design change activities.
2. The design control process is defined and communicated and is understood by affected personnel.
3. Operational specifications and restrictions imposed by the plant design, are appropriately communicated and incorporated into station programs, procedures, practices, and training.
4. Plant design and status documents are accurate and accessible to station personnel.
5. Lessons learned from user feedback, maintenance history, and operating experience are used to improve configuration control processes.
6. Modification designs undergo interdisciplinary technical reviews, and the results are incorporated into the plant design basis.
7. Each modification is planned, scheduled, and tracked throughout design, installation, testing, turnover to operations, training of affected personnel, and completion of document revisions.
8. Temporary modifications are controlled and periodically reviewed for continued need. The number of temporary modifications is minimized. Those needed on a permanent basis are converted in a timely manner.
9. Designs and supporting information, including computer software and special or unique calculations are verified and approved prior to use.
10. Design field changes receive technical reviews and approvals similar to the original.
11. Documents affected by plant modifications such as drawings, procedures, and equipment indexes commonly used for system operation, tagouts, and maintenance, are updated before the modifications are turned over to operations.
12. The as-built configuration of modified systems is verified.
13. Personnel are trained on changes prior to operating or maintaining modified equipment. Affected procedures, operational drawings, and work documents are revised before modified equipment is operated or maintained.
14. Modifications of station simulators and training materials should coincide with or precede the modification of the station.

VI. PROCUREMENT OF PARTS, MATERIALS AND SERVICES

A. Spare Parts, Material and Services

1. Performance Standard

Correct parts and materials in good condition, are available for maintenance activities to support both forced and planned outages. Procurement of services and materials for outages are performed in time to ensure materials will be available without impact to the schedule. Storage of parts and materials support maintaining quality and shelf life of parts and materials.

2. Assessment Guidelines

- A. Policies and procedures are in place for early identification and timely procurement of parts, material, and services. These procedures specifically describe the responsibilities of the company and station personnel involved in the procurement function.
- B. These policies are understood by materials management, materials engineering, systems engineering, design engineering, procurement engineering, purchasing personnel, and other plant personnel who interface with the procurement process, such as maintenance managers, planning and scheduling personnel.
- C. As part of the design change process, spare parts needs are updated and outdated and obsolete materials are removed from the stock system.
- D. Long lead parts and materials are available in advance of planned outages, and verified to be correct prior to being needed in the field.
- E. Minimum/maximum stock levels are periodically reconciled to actual usage.
- F. Adequate engineering and technical review is done to ensure purchased materials meet design specifications.
- G. Materials are receipt inspected to verify procurement specifications are met. Non-conforming materials are controlled to prevent inadvertent use.
- H. Adequate records are maintained to ensure material traceability, if required.
- I. Special handling requirements are specified in procurement documents.
- J. Preventive maintenance requirements for spare components are properly specified and performed to specifications.

- K. Proper precautions are taken for storage of hazardous materials and chemicals, including separation and labeling requirements.
- L. Inventory levels will be verified to actual count on a periodic basis.

VII. EQUIPMENT PERFORMANCE AND MONITORING

A. Equipment Performance and Materiel Condition

1. Performance Standard

Equipment performance and materiel condition support reliable plant operation. This is achieved using a strategy that includes methods to anticipate, prevent, identify, and promptly resolve equipment performance problems and degradation.

2. Assessment Guidelines

- A. Plant equipment operates on demand.
- B. Personnel exhibit a low tolerance for equipment and materiel condition problems by identifying deficiencies and advocating resolution.
- C. Equipment performance monitoring is used to detect problems and degrading performance. Performance monitoring activities include the following:
 - 1. In-service testing and in-service inspections
 - 2. Collection and analysis of performance data and predictive monitoring information, such as thermal, hydraulic, chemical, electrical, acoustical, vibration, and mechanical parameters
 - 3. Routine inspections and walkdowns
 - 4. Analysis of performance history and trends
 - 5. Aggregate reviews and analyses of performance data to determine equipment operability and availability
- D. Performance criteria are established for equipment based on the importance to safety and plant reliability. These criteria address items such as the following:
 - 1. System performance, including reliability and availability
 - 2. Shutdowns, generation losses, and outage extensions
 - 3. Integrity of barriers to the release of hazardous materials
 - 4. Equipment problems that challenge the ability of operations personnel to control the plant and respond to transients
 - 5. Thermal performance
 - 6. Visible equipment condition
- E. Equipment performance and plant materiel condition are measured and compared to established performance criteria.
- F. Predictive maintenance and preventive maintenance are performed on equipment and spare parts to improve equipment performance. The frequency and type of predictive and preventive maintenance are adjusted

based on operating experience, results of reliability analyses, changes in operating conditions and environment, and vendor recommendations.

- G. In-service testing, predictive, and preventive maintenance activities have a technical basis to support equipment performance analysis and changes to the activities.
- H. Deferrals of scheduled predictive and preventive maintenance are infrequent and are justified and authorized by designated management.
- I. Instruments and controls are operational and calibrated within established criteria.
- J. Equipment is protected against the effects of environmental conditions, such as humidity, temperature, dust, and seismic shock.
- K. Chemistry controls are established and implemented to preserve equipment. Specific response actions are established for out-of-specification chemistry conditions.
- L. Temporary repairs receive adequate engineering review, are controlled, and tracked. The use of temporary repairs is minimized, and permanent repairs are made at the earliest reasonable opportunity.
- M. Causes of equipment problems are determined, and corrective actions are implemented and verified for effectiveness. In-depth analysis of equipment failures is commensurate with the importance to plant performance, cost of repairs and the likelihood for recurrence.
- N. Equipment problems receive appropriate attention and timely resolution, based on priorities established through the work management process. Technical support is available to resolve equipment problems.
- O. Repetitive equipment failures are promptly identified and aggressively pursued to resolution.
- P. Component-based operating experience information is shared with the industry, as appropriate.

B. Engineering and Technical Support

1. Performance Standard

Engineering activities are conducted such that equipment performance supports reliable plant operation. Engineering provides the technical information necessary for the plant to be operated and maintained within the operating parameters defined by plant design.

2. Assessment Guidelines

- A. Engineering personnel are actively involved in plant operational activities, such as identifying, analyzing, and resolving conditions that can impact the plant design bases.
- B. Personnel demonstrate and reinforce in others expected culture behaviors, such as a questioning attitude, and personal integrity.
- C. Engineering activities are performed by or under the direct supervision of personnel who have completed applicable educational and qualification guidance for the tasks to be performed.
- D. Engineering personnel use technical information, such as design analyses, operating experience information, and fundamental engineering principles, to provide recommendations on plant operations.
- E. Engineering personnel support station outage goals for scope, efficient use of resources, maintenance support, risk management, configuration control, and duration. Long-range planning is effectively used for engineering activities, such as performance of major modifications and the implementation of engineering changes.
- F. Engineering personnel monitor and evaluate equipment and system performance by examining and trending the results of condition-monitoring activities, reviewing equipment failure history, analyzing availability/reliability information, and performing system walkdowns. Follow-up actions, based on identified problems, trends, and root cause determinations, are timely and effective.
- G. Comprehensive in-service and post modification/maintenance testing is conducted so that equipment necessary for safe and reliable plant operation will perform within established limits. The testing program includes a description of scope and responsibilities, scheduling mechanisms, test procedures, and methods for program updates.
- H. Engineering personnel support the effective maintenance of the plant. Engineering is aware of and proactively pursues maintenance issues.
- I. Processes are in place to communicate technical information and recommendations to the operations and maintenance staffs.
- J. Engineering personnel are familiar with operating experience concerning their areas of expertise and use this experience to prevent and resolve equipment problems and improve plant performance.
- K. Engineering personnel use outside experts, such as vendor representatives or other utility expertise, as necessary, to resolve station problems. Appropriate

controls are implemented to confirm the quality of the support and products supplied by non-plant organizations.

- L. Engineering personnel incorporate industry advances in technology and practices into station activities to improve overall performance.
- M. Engineering personnel are cognizant of generic industry issues. These issues are reviewed for applicability at the station, and appropriate actions are initiated.
- N. Engineering personnel maintain a long-term view of station performance, anticipate issues that could impact long-term plant performance, and develop strategies to address these issues.
- O. Engineering programs, such as those for monitoring flow-accelerated corrosion, in-service testing and inspections, and leak rate testing, are clearly defined and effectively implemented.

C. Chemistry Control

1. Performance Standard

Chemistry controls optimize chemistry conditions during all phases of plant operation and system non-operational periods.

2. Assessment Guidelines

- A. Chemistry specifications and methods of control are clearly established for systems requiring corrosion control. Chemical and biological contaminants are kept to a practical and achievable minimum level.
- B. Sufficient parameters are measured to detect abnormal conditions or changes to conditions. Limits for key parameters are established based on industry technical guidance, where applicable.
- C. Action levels are established and emergency actions are planned and implemented for key chemistry parameters. Out-of-specification conditions and abnormal chemistry are corrected in a timely manner.
- D. Chemistry parameters are maintained within specified bands. Sampling frequency provides timely detection of chemistry trends.
- E. Corrective actions are taken before chemistry specifications are exceeded.
- F. Bulk chemicals, laboratory chemicals, corrosive agents, organic chemicals, and cleaning agents are controlled to prevent improper use or inadvertent introduction into plant systems.
- G. Chemicals and media such as resins are maintained and controlled to preserve their physical and chemical properties.

- H. System leaks that affect chemistry conditions are promptly investigated, and actions are taken to preserve material condition.
- I. System chemistry controls are evaluated and adjusted, as necessary, to improve plant material condition.
- J. The effectiveness of water processing equipment is routinely evaluated, and adjustments are made to improve performance.
- K. Chemistry specifications and methods of control are clearly established for systems requiring corrosion control during non-operational periods, including system startup and shutdown.
- L. Equipment is soaked and flushed, as needed, to remove contaminants prior to corrosion control measures being established, after system cleaning, and prior to startup.
- M. Schedules for plant startup and shutdown contain hold points to verify that system chemistry is within control limits.
- N. Chemistry data is routinely reviewed and trended to identify chemistry control problems and analytical errors.
- O. On-line monitor results are routinely compared with laboratory results. Analytical data is compared to calculated or theoretical data. Investigations are performed when the data does not correlate.
- P. The effectiveness of system chemistry control is determined by measures such as component inspections or corrosion monitoring of selected plant systems.
- Q. On-line chemistry monitors accurately measure, record, and provide alarms for key parameters, where needed. On-line monitors are properly maintained and calibrated.

D. Regulatory Requirements

1. Performance Standard

Regulatory compliance is paramount in the operation of the generating asset. Each regulatory event is properly identified, reported and appropriate action taken to prevent recurrence.

2. Assessment Guidelines

- A. Plant activities are managed to minimize the generation of effluents and emissions.

- B. Liquid waste tank levels are monitored periodically to detect unexpected changes.
- C. Liquid waste are identified and segregated during collection according to the treatment specified for each waste stream.
- D. Processed waste is sampled and analyzed for impurities prior to release or reuse in plant systems.
- E. Established criteria are used to routinely evaluate effluent and emission processing equipment, such as stack gas treatment systems, or filters, demineralizers.
- F. Effluent and emission monitors accurately measure, record, and provide alarms for key parameters, as needed. Effluent monitors are properly maintained and calibrated.

VIII. MAINTENANCE HISTORY

A. Equipment History

1. Performance Standard

Maintenance standards or procedures clearly define requirements for equipment history for the systems and equipment, including, what information or data to collect, how to record data, and how the data is to be used.

2. Assessment Guidelines

- A. Procedures specify requirements for maintenance history, and clearly:
 - 1. Define the method and manner of equipment identification
 - 2. Define the engineering data base or other method for retaining the maintenance history
 - 3. Define the systems and equipment that require documentation and retention of historical data
 - 4. Define the minimum set of information to be included in the data base for each component
- B. Procedures clearly define the type of data to be collected and recorded. Accountabilities for data entry are also clearly specified. Some examples of data to include or cross-reference in equipment history are as follows:
 - 1. Corrective maintenance records with failure modes and causes included
 - 2. Appropriate preventive and predictive maintenance records and design modification packages
 - 3. As-found condition during corrective and preventive maintenance
 - 4. Vendor repair information (for example, correspondence on component repairs and modification bulletins)
 - 5. Startup tests and other baseline data
 - 6. Appropriate surveillance test data
 - 7. Calibration data
 - 8. Spare parts information
 - 9. Applicable industry experience information
- C. Maintenance history is periodically and systematically reviewed and problems trended. Problems are investigated and corrective actions taken.
- D. Maintenance History Database is updated when modifications occur.

IX. MAINTENANCE FACILITIES, TOOLS AND EQUIPMENT

A. Maintenance Facilities and Equipment

1. Performance Standard

Facilities and equipment are adequate to effectively support maintenance activities.

2. Assessment Guidelines

- A. Maintenance facility size and arrangement promote safe and effective work and training activities. Appropriate facilities are provided for work on equipment involving hazardous materials.
- B. Work area lighting and other environmental conditions promote safe and effective working conditions.
- C. Work areas are maintained in a clean and orderly condition.
- D. Tools, equipment, and consumable supplies are available to support work. Appropriate equipment is available for loading, lifting, and transporting equipment.
- E. Suitable storage is provided for tools, supplies, and equipment. Special tools, jigs, and fixtures are identified and stored to permit ready retrieval.
- F. Rigging equipment and scaffolding are identified, tested, and properly stored.
- G. Facilities, equipment, and tools are maintained in good repair.
- H. Measuring and test equipment is calibrated and controlled to provide accuracy and traceability. Out of tolerance test equipment is removed from service. Plant equipment maintained with out of tolerance test equipment is evaluated in a timely manner for operability, and deficiencies are corrected as necessary.
- I. Equipment is accessible for maintenance activities. Fixed local area hoists and work platforms are provided, as needed, to facilitate maintenance access to plant equipment.
- J. Communications equipment is provided and is available to support maintenance activities.

**APPENDIX D: GENERATOR OPERATION STANDARDS
[RESERVED]**

APPENDIX E: FINES FOR SPECIFIED VIOLATIONS

VIOLATION	FINE
Failure to file an Initial Certification, Recertification, or Notice of Material change at the time or in the manner required by this General Order.	\$1,000 per incident <i>plus</i> \$500 per day for the first ten calendar days the filing was late and \$500 for each day thereafter.
Failure to maintain logbooks as required by this General Order.	\$5,000 per incident.
Failure to respond to an Information Requirement set forth in section 10.0 of this General Order.	\$1,000 per incident <i>plus</i> \$500 per day for the first ten calendar days the Information Requirement was not satisfied after being requested and \$1,000 for each day thereafter.
Negligent submission of inaccurate information in response to an information request under section 10.0 of this General Order.	\$2,000 per incident <i>plus</i> \$500 per day for the first ten days the inaccuracy was not corrected and \$1,000 for each day thereafter.
Repeated violation of any requirement listed in this schedule.	200% of the fine that would be imposed for a first-time violation.

(END OF APPENDIX E)

APPENDIX F: GENERATOR LOGBOOK STANDARDS (HYDROELECTRIC ENERGY)

LOGBOOK STANDARDS FOR HYDROELECTRIC GENERATING FACILITIES

Adopted April 7, 2004,
by the California Electricity Generation Facilities Standards Committee

I. PURPOSE

The intent of this document is to define requirements for operation logs for attended and unattended hydroelectric generating facilities. These standards are intended to ensure that operating information associated with normal operation, maintenance, and abnormal activities are properly recorded and available for review and analysis by regulatory agencies

II. GENERAL

Owners of hydroelectric generating facilities shall maintain logbooks or other data collection systems that contain the chronological, real-time operational history of the facilities. Logbooks shall include accurate and concise entries regarding the operations and maintenance of the facility and overall status of the generating units and auxiliary equipment. Logbooks shall be maintained at attended facilities, control centers for unattended facilities, and unattended facilities, as described more fully below.

Logbooks shall include, as appropriate, entries of important and/or unusual events relating to safety, accidents, environmental matters, and any other information pertinent to operations. Where information is unit specific, information for each unit must be recorded and so identified. Logbooks shall also contain entries noting operations and maintenance communications between the facility operator and outside entities, including but not limited to the Independent System Operator (ISO), scheduling coordinators or headquarters facilities, regulators, environmental agencies, CalOSHA or similar agencies. The logbooks shall be maintained notwithstanding and in addition to any other similar requirements that mandate that events be recorded.

Owners of hydroelectric generating facilities must collect and record, either through automated data collection systems, written logbooks, or both, all information specified in this standard. Such information must be readily available to operators, California Public Utilities Commission staff, and other authorized personnel at all times, and must be kept for a minimum period of five years from the date of collection. The owner of the hydroelectric facility is responsible for maintaining the integrity of the information collected and recorded. Any corrections to logbook entries shall be made in a manner that preserves the legibility or integrity of the original entry, and identifies the date and time of the correction. Each utility (and facility) will maintain a list of any approved abbreviations used by operators in that utility (and that particular facility), along with a definition of each abbreviation.

III. REQUIRED INFORMATION

A. Attended Facilities and Control Centers for Unattended Facilities

Logbooks at attended facilities and control centers for unattended facilities shall be the chronological, real-time record of the operation and maintenance activities that occur either at the attended facility or the unattended facilities within the jurisdiction of the control center, respectively.

Information collected and recorded by automatic devices may be maintained separately and need not be entered in the logbook itself, provided that the information is available for review and shall be maintained in accordance with the standards set forth herein for the daily operations logbooks.

Each logbook shall consist of accurate, concise entries and shall contain at least the information specified below. To the extent any of the information below is not available to the control center operator, it shall be captured either by automated systems or recorded in the Unattended Facilities Log.

1. Orders and other communications received and transmitted by the operator, as appropriate, including but not limited to those from or to the Independent System Operator (ISO); scheduling coordinators, headquarters facilities and/or dispatchers; transmission operating centers; regulators; environmental agencies; CalOSHA; or similar agencies;
2. Actions taken by the operator to change load, derate the unit, or take the unit off line,
3. Operational data, including power production (load) levels, water flows, the availability and operation of automatic generation control (AGC), and any generation limits applicable to AGC operation other than the normal limits specified in the Participating Generator Agreement with the California Independent System Operator;
4. Operation of system protection relays;
5. Water regulation (e.g., downstream water requirements, FERC license requirements);
6. Unit separation and parallel times;
7. Clearances/Work authorizations;
8. Reporting on and off clearances;
9. Start and completion of switching operations;
10. The application, removal, moving, or change in location and/or number of grounding devices;
11. Site emergency activities; including but not limited to accidents, spills and earthquakes;
12. Trouble reports; including but not limited to those involving equipment failures and those from outside persons or entities;
13. Daily operations, including unit outages and de-ratings, Automatic Voltage Regulator/Power System Stabilizer operations, voltage operations, governor operations, and black-start operations, if applicable;
14. Special system setups for hydraulic, mechanical, electrical or pneumatic systems.

Each entry shall include the time, location and description of event, including, as relevant, the equipment involved, loads and other readings, voltage orders, directed load changes, deviations from generation schedules, weather,

annunciator alarms or other indications, relay target information including device number, limitations, notifications, and corrective actions. Entries noting communications between the operator and outside parties shall include the names of the persons involved in the communication.

B. Unattended Facilities

Logbooks at unattended facilities shall be the chronological record of operation and maintenance activities that occur when personnel visit an unattended facility. Entries in logbooks at unattended facilities shall be made consecutively and shall include the following information, as applicable:

1. Time and date of entry and exit;
2. Name(s) of personnel entering/exiting the station;
3. Location of event;
4. Text description of event/reason for entering station;
5. All information pertinent to event, including but not limited to equipment involved, loads and other readings, voltage orders, directed load changes, deviations, weather, annunciator alarms or other indications, relay target information including device number, curtailments, limitations, notifications, corrective actions;
6. The application, removal, moving, or change in location and/or number of grounding devices;
7. Clearances/Work authorizations.

(END OF APPENDIX F)

(END OF GENERAL ORDER)